

SUREKEY EXAMINATIONS BOARD



"Don't speak for Quality, Let Quality Speak for itself"

2024



MATHEMATICS SUPER SERIES

OFFICIAL MARKING GUIDE

SECTION A: 40 MARKS

**Answer all questions in this Section
Questions 1 to 20 carry two marks each**

1. Workout: $\frac{2}{3} \times \frac{1}{8}$.

$$\begin{array}{r}
 2 \times 1 \\
 3 \quad 8 \\
 1 \times 1 \\
 3 \times 4 \\
 \hline
 1 \\
 12
 \end{array}$$

2. Write 512.604 in words.

Five hundred twelve and six hundred four thousandths OR

Five hundred twelve point six zero four.

3. Given that $W = \{2 \times 2 \times 3\}$ and $X = \{2^3 \times 3^2\}$. Find the Least Common Multiple (LCM) of W and X.

$$\begin{aligned}
 LCM &= \text{Product of the union} \\
 &= \{2 \times 2 \times 2 \times 3 \times 3\} \\
 &= 8 \times 9 \\
 &= 72
 \end{aligned}$$

4. Round off 47657 to the nearest hundreds.

TTH	TH	H	T	O
4	7	6	5	7

D.P.V (Add 100)

R.P.V

$$\begin{array}{r}
 47600 \\
 + 100 \\
 \hline
 47700
 \end{array}$$

$47657 \approx 47700$

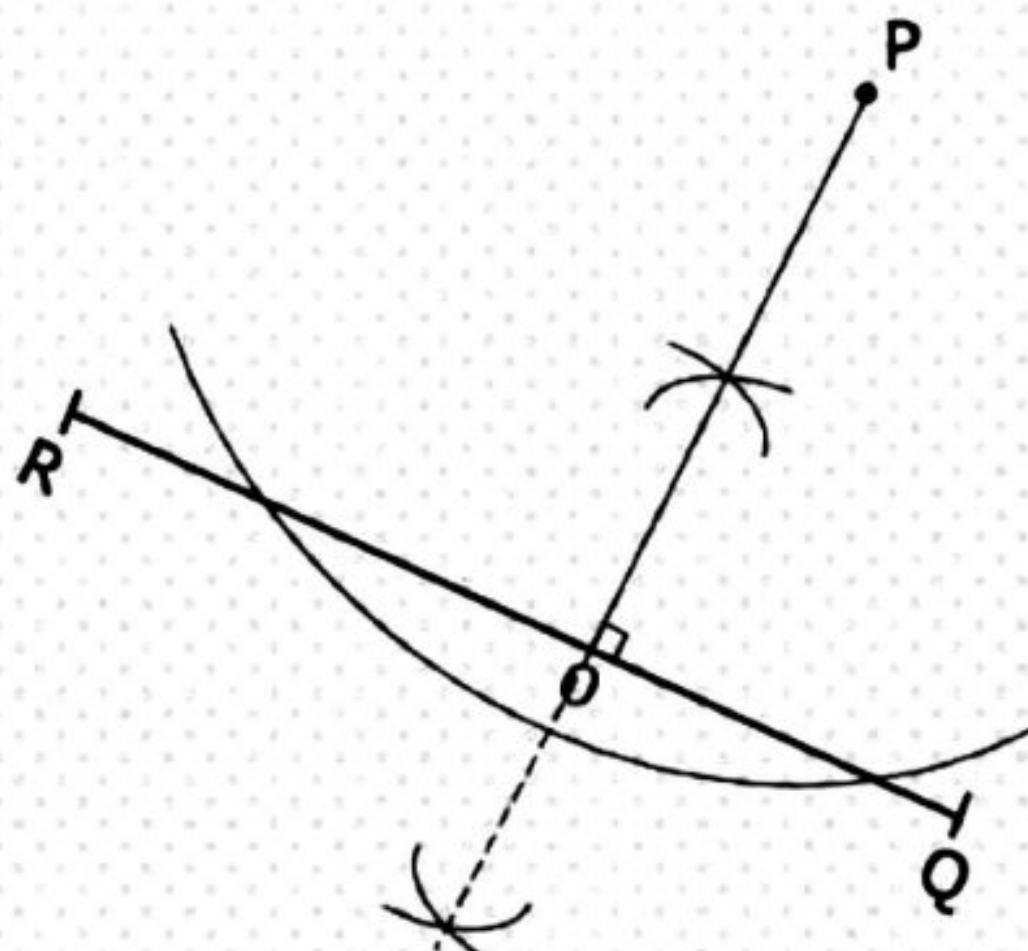
5. In a basket, there are 3 bad eggs and the rest are good. The probability that a bad egg is picked at random from the basket is 15%. How many good eggs are in the basket?

$$\begin{aligned}
 \text{Total number of eggs} & \\
 3 + 15 & \\
 100 & \\
 3 \times 100 & \\
 15 & \\
 20 \text{ eggs} & \\
 \text{Number of good eggs} & \\
 20 - 3 & \\
 17 \text{ eggs} &
 \end{aligned}$$

$$\begin{aligned}
 \text{OR} \\
 \text{Percentage of good eggs} & \\
 100\% - 15\% & \\
 85\% & \\
 \text{Number of good eggs} & \\
 15\% \text{ rep } 3 \text{ eggs} & \\
 1\% \text{ rep } \frac{3}{15} & \\
 85\% \text{ rep } \frac{3}{15} \times 85 & \\
 15 &
 \end{aligned}$$

85% rep 17 eggs

6. Using a ruler, a pencil and a pair of compasses only, drop a perpendicular from point P to meet line segment RQ at point O.



7. A trader bought an article at Sh.30,000. He later sold it at a gain of $16\frac{2}{3}\%$.
Find the trader's gain.

$$\begin{aligned} & 16\frac{2}{3}\% \text{ of sh.30000} \\ & \left[\frac{50}{3} + \frac{100}{1} \right] \times \text{sh.30000} \\ & \left(\frac{50}{3} \times \frac{1}{100} \right) \times \text{sh.30000} \\ & \frac{50}{300} \times \text{sh.30000} \\ & \text{sh.5000} \end{aligned}$$

$$\begin{aligned} & 50 \times \text{sh.100} \\ & \text{sh.5000} \end{aligned}$$

8. Subtract $3g - 8$ from $15 - 6g$.

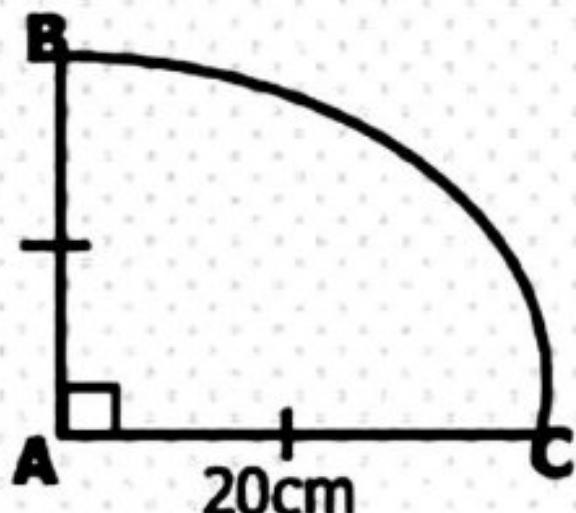
$$\begin{aligned} & (15 - 6g) - (3g - 8) \\ & 15 - 6g - 3g + 8 \\ & 15 + 8 - 6g - 3g \\ & 23 - 9g \end{aligned}$$

9. Find the binary base numeral represented by 13.

$$\begin{aligned} & \text{Binary is base two} \\ & 13 \div 2 = 6 \text{ rem } 1 \\ & 6 \div 2 = 3 \text{ rem } 0 \\ & 3 \div 2 = 1 \text{ rem } 1 \\ & 1 \div 2 = 0 \text{ rem } 1 \end{aligned}$$

$$13 = 1101_{\text{two}}$$

10. The figure below is a quadrant ABC of radius 20cm.



Find the length of the arc BC. (Use π as 3.14)

$$\begin{aligned} C &= \frac{12\pi r}{4} \\ &= \frac{1}{4} \times 2 \times 3.14 \times 20 \text{ cm} \\ &= \frac{1}{4} \times 2 \times \frac{314}{100} \times 20 \text{ cm} \end{aligned}$$

$$\begin{aligned} & \frac{314}{10} \\ & 31.4 \text{ cm} \end{aligned}$$

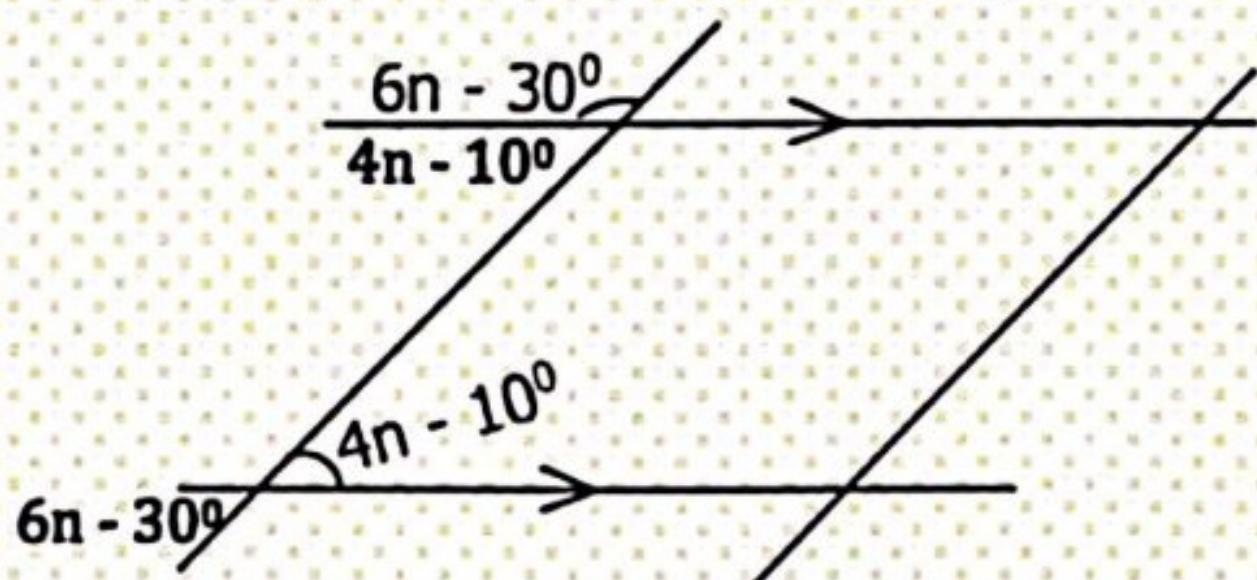
11. Find the sum of the next two numbers in the sequence below.

$$\begin{array}{l}
 -6, -8, -10, -12, \dots -14\dots, \dots -16\dots \\
 -6 - 2 = -8 \\
 -8 - 2 = -10 \\
 -10 - 2 = -12 \\
 -12 - 2 = -14 \\
 -14 - 2 = -16
 \end{array}
 \quad
 \begin{array}{l}
 -14 + -16 \\
 -14 + (-16) \\
 -14 - 16 \\
 -30
 \end{array}$$

12. A son is a half the father's age. The product of their ages is 200 years. How old is the father?

<u>Let the son's age be y</u> Father will be $2y$ $y \times 2y = 200$ $2y^2 = 200$ $\frac{2y^2}{2} = \frac{200}{2}$ $y^2 = 100$ $\sqrt{y^2} = \sqrt{100}$ $y = 10$	Son = 10 years Father = $2 \times y$ $= 2 \times 10$ $= 20$ years.	OR <u>Let the father's age be y.</u> Son's age will be $\frac{1}{2}y$ $\frac{y}{2} \times \frac{1}{2}y = 200$ $\frac{y^2}{2} = 200$ $\frac{y^2 \times 2}{2} = \frac{200 \times 2}{2}$	$y^2 = 400$ $\sqrt[3]{y^2} = \sqrt[3]{400}$ $y = 20$ The father is 20 years.
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13. Find the value of n in the figure below.



$$\begin{aligned}
 4n - 10^\circ + 6n - 30^\circ &= 180^\circ \\
 4n + 6n - 10^\circ - 30^\circ &= 180^\circ \\
 10n - 40^\circ &= 180^\circ \\
 10n - 40^\circ + 40^\circ &= 180^\circ + 40^\circ \\
 10n &= 220^\circ \\
 \frac{10n}{10} &= \frac{220^\circ}{10} \\
 n &= 22^\circ
 \end{aligned}$$

14. A, B and C shared Sh.98,000 in the ratio of 2:m:7 respectively.

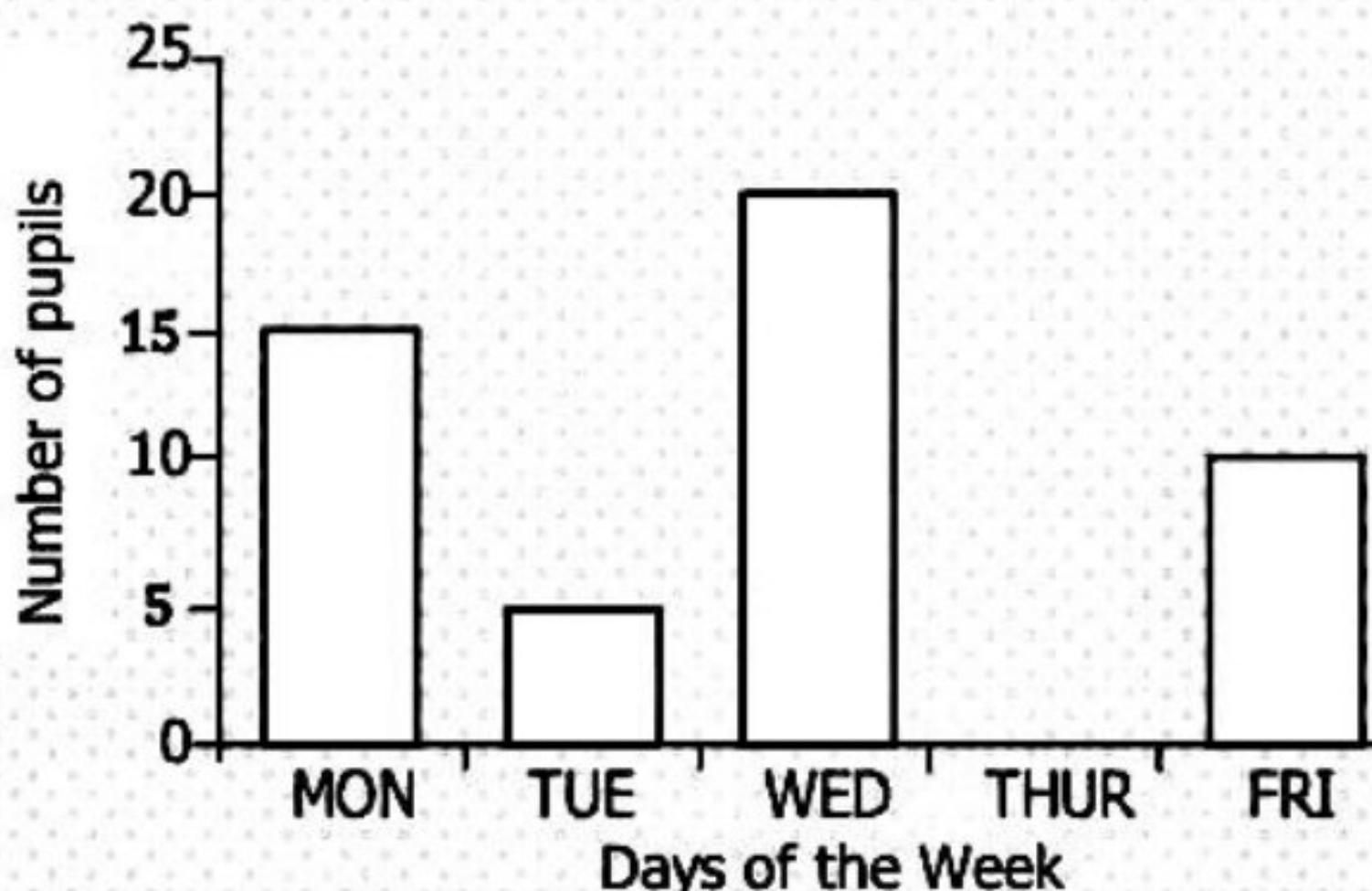
If B got Sh.35,000. Find the value of m.

<u>Total ratio of A and C</u> $2 + 7$ 9 parts $sh.98000$ $- sh.35000$ $sh.63000$	$sh.7000$ is rep by 1 part $sh.35000$ is rep by $sh.35000$ $sh.7000$ $sh.35000$ is rep by 5 parts; hence $m = 5$	$sh.98000 m$ $9 + m$ $sh.98000m \times \frac{9+m}{9+m}$ $sh.98000m = sh.315000 + sh.35000m$ $98m = 315 + 35m$ $98m - 35m = 315 + 35m - 35m$ $\frac{63m}{63} = \frac{315}{63}$ $m = 5$
9 parts rep $sh.63000$ 1 part rep $sh.63000$ $\frac{9}{9}$ 1 part rep $sh.7000$	$m \times sh.98000 = sh.35000$ $2 + m + 7$	

15. A thanksgiving prayer at Kibilibiri Primary School started at 10:45pm and ended at 1:10a.m. For how long did the prayer last?

<u>Remaining hours to midnight</u>	<u>Duration of prayer</u>	The prayer lasted for 2 hours and 25 minutes
HR MIN $12 : 00$ $- 10 : 45$ $1 : 15$	HR MIN $1 : 15$ $+ 1 : 10$ $2 : 25$	

16. The graph below shows the number of pupils who were absent in a class of 50 pupils during a period of one week in Top Care P/S.



Workout the average attendance for the week.

$$\begin{aligned}\text{Average} &= \frac{\text{S.O.D}}{\text{N.O.D}} \\ &= \frac{(50 - 15) + (50 - 5) + (50 - 20) + 50 + (50 - 10)}{5} \\ &= \frac{35 + 45 + 30 + 50 + 40}{5} \\ &= \frac{200}{5} \\ &= 40\end{aligned}$$

17. Solve: $2m - 3 = 2$ (finite 7)

$$\begin{aligned}2m - 3 + 3 &= 2 + 3 \text{ (finite 7)} \\ 2m &= 5 \text{ (finite 7)} \\ 2m &= 5 + 7 \text{ (finite 7)} \\ 2m &= 12 \text{ (finite 7)} \\ 2m &= 12 \text{ (finite 7)} \\ 2 &= 2 \\ m &= 6 \text{ (finite 7)}\end{aligned}$$

18. What number has been expanded to get $(6 \times 10^3) + (5 \times 10^{-2})$?

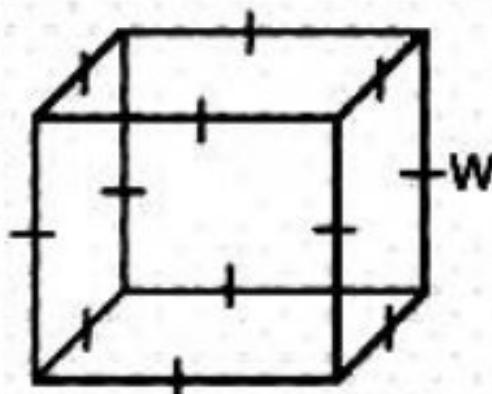
$$\begin{aligned}(6 \times 10 \times 10 \times 10) + (5 \times \frac{1}{100}) \\ 6000 + \frac{5}{100} \\ 6000 + 0.05 \\ 6000.05\end{aligned}$$

19. 5 men can dig a garden in 8 days. How many days do 4 men take to do the same piece of work?

$$\begin{aligned}5 \text{ men dig in } 8 \text{ days} \\ 1 \text{ man digs in } 5 \times 8 \\ 1 \text{ man digs in } 40 \text{ days} \\ 4 \text{ men dig in } 40 \div 4 \\ 4 \text{ men dig in } 10 \text{ days.}\end{aligned}$$

20. Below is a cube whose total surface area is 600m^2 .

Find the value of w .



$$\begin{aligned}6s^2 &= \text{T.S.A} \\6w^2 &= 600\text{m}^2 \\6w^2 &= 600\text{m}^2 \\6 &= 6 \\w^2 &= 100\text{m}^2 \quad \cancel{6} \\w^2 &= \sqrt{100\text{m}^2} \\w &= 10\text{m}\end{aligned}$$

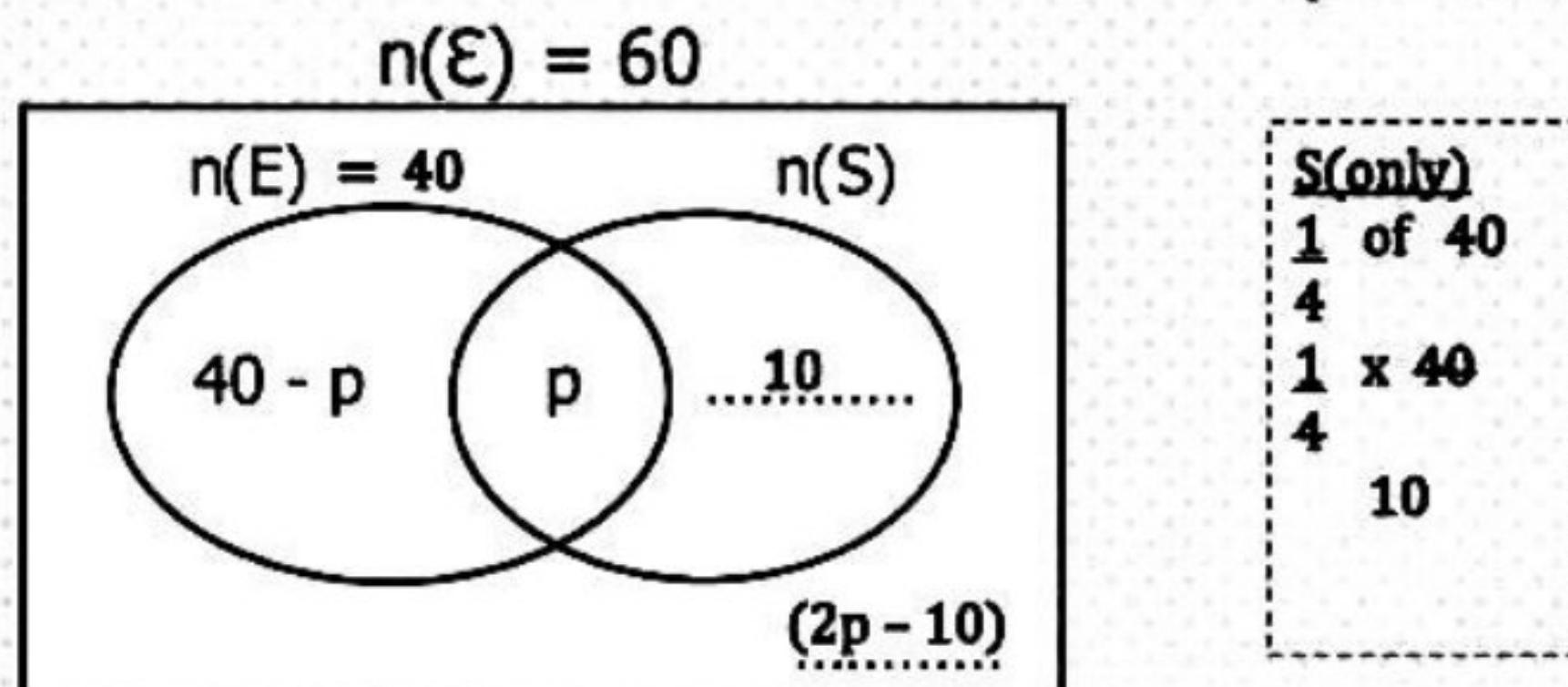
SECTION B: 60 MARKS

Answer **all** questions in this section

Marks for each question are indicated in brackets.

21. In a class of 60 pupils, 40 pupils like English (E), $\frac{1}{4}$ of the pupils who like English like Science (S) only. p pupils like both English and Science while $(2p - 10)$ pupils do not like any of the two subjects.

- (a) Complete the Venn diagram below using the above information. (02 Marks)



- (b) Find the number of pupils who like none of the subjects.

$$\begin{array}{lcl}40 + 10 + (2p - 10) & = & 60 \\50 - 10 + 2p & = & 60 \\40 + 2p & = & 60 \\40 - 40 + 2p & = & 60 - 40 \\2p & = & 20\end{array} \quad \begin{array}{l} \text{Pupils who like none} \\ 2p - 10 \\ 20 - 10 \\ 10 \text{ pupils} \end{array} \quad (03 \text{ Marks})$$

22. (a) Simplify: $\frac{0.48 \times 0.45}{0.09 \times 0.8}$ (03 Marks)

$$\begin{array}{rcl} \frac{48}{100} \times \frac{45}{100} & + & \frac{9}{100} \times \frac{8}{10} \\ \frac{48}{100} \times \frac{45}{100} & \times & \frac{100}{9} \times \frac{10}{8} \\ \frac{6 \times 5}{10} & & \\ \frac{30}{10} & & \end{array} \quad 3 // 3.0$$

(b) Change 0.636363.....into a common fraction in its lowest form. (03 Marks)

Let the fraction be x

$$\begin{aligned}
 x &= 0.6363\ldots \\
 x \times 100 &= 0.6363 \times 100 \\
 100x &= 63.63\ldots \\
 -x &= 0.63\ldots \\
 \hline
 99x &= 63 \\
 \frac{99x}{99} &= \frac{63}{99} \\
 x &= \frac{7}{11}
 \end{aligned}$$

Method 2

$$\begin{aligned}
 0.6363\ldots \text{short form} &= \overline{0.63} \\
 \text{Non recurring} &= 0 \\
 \text{As a fraction} &= \frac{0}{1} \\
 &= \frac{63 - 0}{100 - 1} \\
 &= \frac{63}{99} \\
 &= \frac{7}{11}
 \end{aligned}$$

23. The table below shows the ages of children who were immunized against COVID 19 at Mubende Referral Hospital on a certain day.

Age	5	8	13	10
Number of children	3	4	1	r

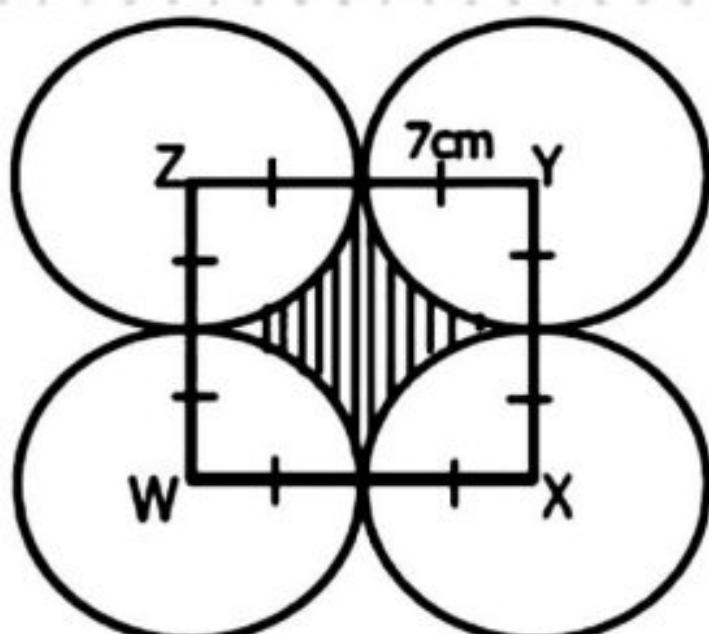
- (a) Find the value of r if their average age was 8. (03 Marks)

$$\begin{aligned}
 \text{S.O.D} &= \text{Ave} \times \text{N.O.D} \\
 (5 \times 3) + (8 \times 4) + (13 \times 1) + (10 \times r) &= 8(3 + 4 + 1 + r) \\
 15 + 32 + 13 + 10r &= 8(8 + r) \\
 60 + 10r &= 64 + 8r \\
 60 - 60 + 10r &= 64 - 60 + 8r \\
 10r &= 4 + 8r \\
 10r - 8r &= 4 + 8r - 8r \\
 2r &= 4
 \end{aligned}$$

- (b) What was the modal age of the immunized children? (01 Mark)

The modal age was 8

24. The diagram below shows four circles in contact, each of radius 7cm. A quarter of each circle is occupied by a square WXYZ. Study it carefully and answer the questions that follow.



- (a) Workout the area of the square. (02 Marks)

$$\begin{aligned}
 \text{Area} &= S \times S \\
 \text{Area} &= 14\text{cm} \times 14\text{cm} \\
 \text{Area} &= 196\text{cm}^2
 \end{aligned}$$

- (b) Find the area of the shaded region. (Use π as $\frac{22}{7}$)

<u>Area of Unshaded parts</u> $ \begin{aligned} \text{Area} &= 4 \times \frac{1}{4}\pi r^2 \\ &= 4 \times \frac{1}{4} \times \frac{22}{7} \times 7\text{cm} \times 7\text{cm} \\ &= 22 \times 7\text{cm}^2 \\ \text{Area} &= 154\text{cm}^2 \end{aligned} $	<u>Shaded region</u> $ \begin{aligned} &196\text{cm}^2 \\ &- 154\text{cm}^2 \\ &\hline &42\text{cm}^2 \end{aligned} $
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25. Goretti went to the Supermarket and bought the items below which were written on her shopping list.

- 750g of rice each at Sh.5,200 per kilogram
- $1\frac{1}{2}$ litre of cooking oil at Sh.3,500 per litre.
- 2kg of flour at Sh.4,400.

- (a) How much did she pay for all the items on the list? (03 Marks)

<u>Rice</u>	<u>Oil</u>	<u>Total Expenditure</u>
$\underline{750} \times \text{sh.}5200$	$\underline{3} \times \text{sh.}3500$	$\text{sh.}4400$
$\underline{1000}$	$\underline{2}$	$\text{sh.}5250$
$\text{sh.}75 \times 52$	$\text{sh.}3 \times 1750$	$\underline{+ \text{sh.}3900}$
$\text{sh.}3900$	$\text{sh.}5250$	$\text{sh.}13550$

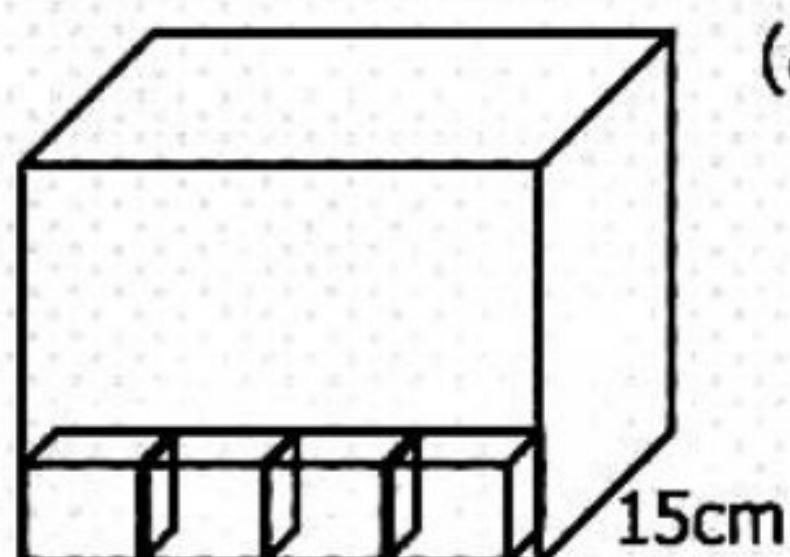
- (b) Find the cost of 3 litres of cooking oil at the same rate.

$$\begin{array}{r} \text{sh.}3500 \\ \times \quad \underline{3} \\ \hline \text{sh.}10500 \end{array} \quad (01 \text{ Mark})$$

26. Kakama bought 20 litres of milk at Sh.1,500 each. On his way home, some milk poured and he sold the remaining milk at Sh.1,200 per half litre and made a profit of 20%. How much milk was poured?

<u>Buying price</u>	<u>Let the milk poured be y</u>	(04 Marks)
$\text{sh.}1500 \times 20$	<i>Milk sold will be $20 - y$</i>	$-24y = -120$
$\text{sh.}30000$	<i>Cost of 1 litre = sh.1200 $\times 2$</i>	$-24 = -24$
<u>Selling price</u>	<i>sh.2400</i>	$y = 5$
$100\% + 20\%$	<i>Since milk sold is $20 - y$, therefore,</i>	<i>5 litres of milk were poured.</i>
120%	$\text{sh.}2400(20 - y) = \text{sh.}36000$	
$\underline{120} \times \text{sh.}30000$	$\text{sh.}48000 - \text{sh.}2400y = \text{sh.}36000$	
100	$480 - 24y = 360$	
$\text{sh.}36000$	$480 - 480 - 24y = 360 - 480$	
	$-24y = -120$	

27. Joyce packed Royco cubes each of volume 64cm^3 in a cuboidal box. 10 layers were formed in the box and 4 cubes were packed along the length as shown below.



- (a) How many Royco cubes did Joyce pack in the box altogether?

$$\begin{aligned} \text{Side length of each cube} \\ S \times S \times S &= V \\ S^3 &= 64\text{cm}^3 \\ \sqrt[3]{S^3} &= \sqrt[3]{64\text{cm}^3} \end{aligned}$$

<u>S</u> = 4 cm	<u>Number of cubes packed in the box</u>
<i>Cubes along the width</i>	15cm
	4cm
	<i>3 cubes</i>
<i>Cubes along the length</i>	4 cubes
	<i>cubes along the height</i>
	<i>10 cubes</i>
	$10 \times 4 \times 3$
	120 cubes

(b) Calculate the space left in the box after packing the Royco cubes in the box.	(03 Marks)	
<u>Height of box</u> 10×4 40cm <u>Length of box</u> $4 \times 4\text{cm}$ 16cm	<u>Volume of box</u> $V = L \times W \times H$ $= 16\text{cm} \times 15\text{cm} \times 40\text{cm}$ $= 16\text{cm} \times 600\text{cm}^2$ $= 9600\text{cm}^3$ <u>Volume of Royco cubes</u> $V = 120 \times 64\text{cm}^3$ $= 7680\text{cm}^3$	<u>Space left in the box after packing</u> $= 9600\text{cm}^3$ $= -7680\text{cm}^3$ 1920cm^3

28. Nambasa borrowed a certain sum of money from ABSA bank at an interest rate of $12\frac{1}{2}\%$ per annum. At the end of 3 years, he had paid back a total of Sh.330,000.

- (a) How much did she borrow from the bank? (04 Marks)

$$\begin{aligned}
 P + I &= \text{Amount} \\
 P + PRT &= \text{sh.330000} \\
 P + P \times 12\frac{1}{2} \times 3 &= \text{sh.330000} \\
 \frac{100}{2} & \\
 P + P \times \left(\frac{25}{2} + \frac{100}{1} \right) \times 3 &= \text{sh.330000} \\
 P + P \times \frac{25}{2} \times \frac{1}{1} \times 3 &= \text{sh.330000} \\
 \frac{2 \times 100}{200} & \\
 P + \frac{75P}{200} &= \text{sh.330000} \\
 200 \times P + \frac{75P}{200} \times 200 &= \text{sh.330000} \times 200 \\
 \frac{200}{200} & \\
 200P + 75P &= \text{sh.66000000} \\
 275P &= \text{sh.66000000} \\
 \underline{275P} &= \underline{\text{sh.66000000}} \\
 \underline{-275} & \quad \underline{275} \\
 P &= \text{sh.240000}
 \end{aligned}$$

She borrowed sh.240000 from the bank

- (b) How much interest did she pay in the 3 years? (01 Mark)

$$\begin{aligned}
 \text{Interest} &= \text{Amount} - \text{principal} \\
 &= \text{sh. 330000} \\
 &\quad - \underline{\text{sh. 240000}} \\
 &\quad \underline{\text{sh. 90000}}
 \end{aligned}$$

She paid sh.90000 interest in the 3 years.

29. At China Town, 8 pens cost two fifth the cost of a book and a set costs Sh.5,000 less than the cost of a book. If the total cost of all the 3 items is Sh.19,000. How much will Tom pay for a dozen of pens? (05 Marks)

Let the cost of a book be y

book	8pens	set
y	$\frac{2}{5}y$	Y - sh.5000

$$y + \frac{2y}{5} + y - sh.5000 = sh.19000$$

$$\frac{5y + 2y \times 5 + y \times 5 - sh.5000 \times 5}{5} = sh.19000 \times 5$$

$$\frac{5y + 2y + 5y - sh.25000}{5} = sh.95000$$

$$10y - sh.25000 = sh.95000$$

$$12y - sh.25000 + sh.25000 = sh.95000 + sh.25000$$

$$\frac{12y}{12} = sh.120000$$

$$y = sh.10000$$

Cost of 8 pens

$$2 \times sh.10000$$

5

$$2 \times sh.2000$$

$$sh.4000$$

Cost of a dozen pens

$$sh.4000 \times 12$$

8

$$sh.500 \times 12$$

$$sh.6000$$

30. A driver left Mukono moving at a speed of 60km/h for $2\frac{1}{2}$ hours to Jinja. He took breakfast for 30 minutes and then returned to Mukono directly through the same route at a steady speed of 50km/h.

- (a) How far is Jinja from Mukono? (02 Marks)

$$\begin{aligned} \text{Distance} &= \text{Speed} \times \text{Time} \\ &= 60\text{km/hr} \times 2\frac{1}{2}\text{hr} \\ &= \frac{60\text{km}}{\text{hr}} \times \frac{5\text{hr}}{2} \\ &= 30\text{km} \times 5 \\ &= 150\text{km} \end{aligned}$$

- (b) Calculate the driver's average speed for the whole journey. (03 Marks)

Time taken on return journey

$$\begin{aligned} \text{Time} &= \text{Distance} + \text{speed} \\ &= 150\text{km} + \frac{50\text{km}}{\text{hr}} \\ &= \frac{150\text{km}}{50\text{km}} \times \text{hr} \\ &= 3\text{ hr} \end{aligned}$$

Total distance

$$\begin{aligned} &= 150\text{km} \times 2 \\ &= 300\text{km} \end{aligned}$$

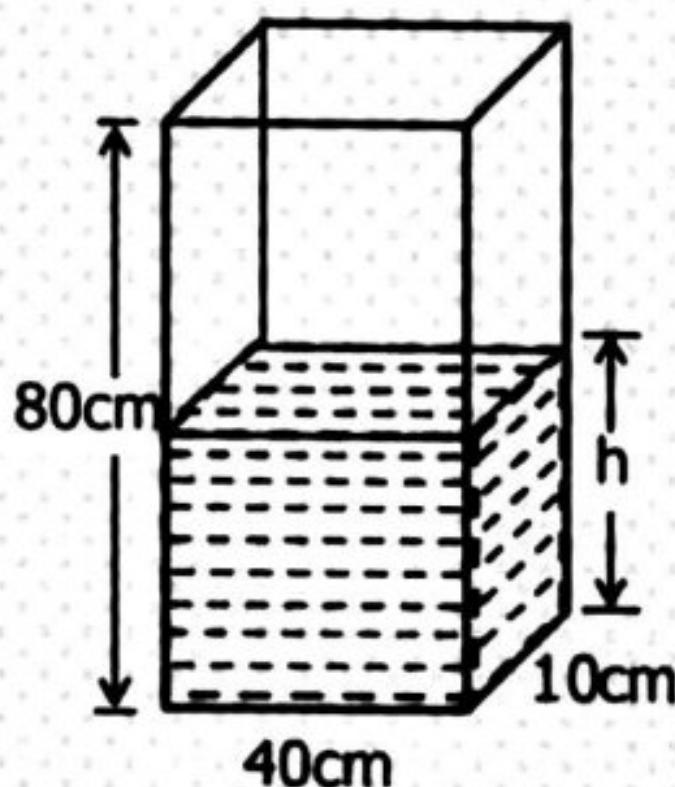
Total time taken

$$\begin{aligned} &2\frac{1}{2}\text{hr} + \frac{1}{2}\text{hr} + 3\text{h} \\ &6\text{hr} \end{aligned}$$

Average speed for the whole journey

$$\begin{aligned} &= \frac{\text{Total Distance}}{\text{Total time}} \\ &= \frac{300\text{km}}{6\text{hr}} \\ &= 50\text{km/hr} \end{aligned}$$

31. The tank below is $\frac{1}{4}$ empty of water. Study it carefully and answer the questions that follow.



- (a) Find the value of h . (02 Marks)

<u>Empty height</u>	<u>Value of h</u>	<u>Fraction of water in the tank</u>	<u>Value of h</u>
$1 \times 80 \text{ cm}$	$80\text{cm} - 20\text{cm}$	$\frac{4}{4} - \frac{1}{4}$	$3 \times 80 \text{ cm}$
4	60cm	$\frac{3}{4}$	4
$1 \times 80\text{cm}$			$3 \times 20 \text{ cm}$
4			60cm
20cm			

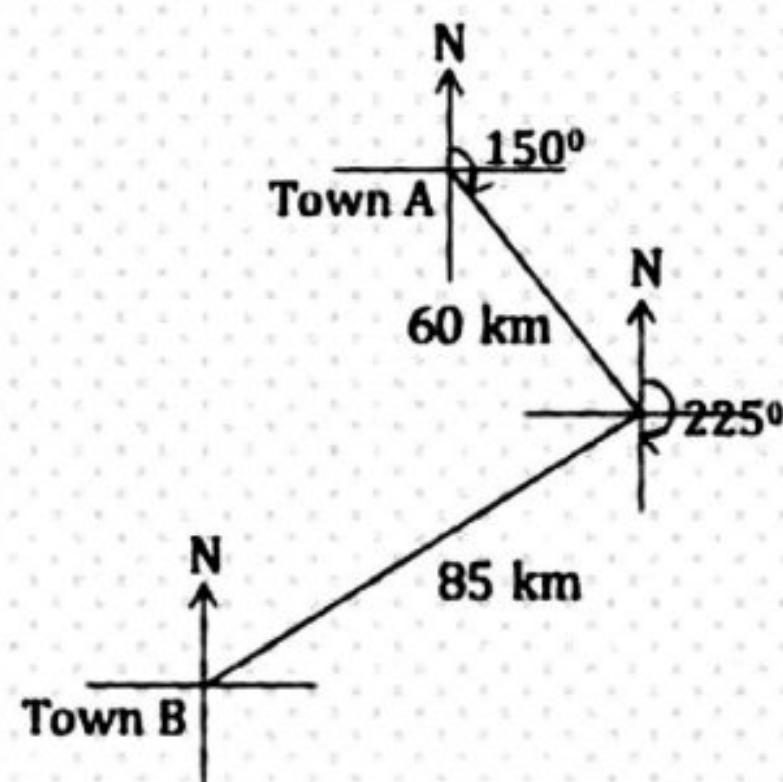
- (b) How much water in litres, is required to make the tank completely full? (03 Marks)

Number of litres needed

$$\begin{aligned}
 &= \text{Volume} \\
 &= 1000\text{cm}^3 \\
 &= L \times W \times H \\
 &= 1000 \text{ cm}^3 \\
 &= 40 \text{ cm} \times 10 \text{ cm} \times 20 \text{ cm} \\
 &\quad 1000\text{cm}^3 \\
 &= 8000\text{cm}^3 \\
 &\quad 1000\text{cm}^3 \\
 &= 8 \text{ litres}
 \end{aligned}$$

32. Ochia walked 60km from town A at a bearing of 150° . Before reaching his destination, he changed his direction and walked 85km at a bearing of 225° to town B.

- (a) Draw a sketch diagram of Ochia's movement. (01 Mark)



- (b) Using a scale of 1cm to represent 10km, draw an accurate diagram showing Ochia's movement. (04 Marks)

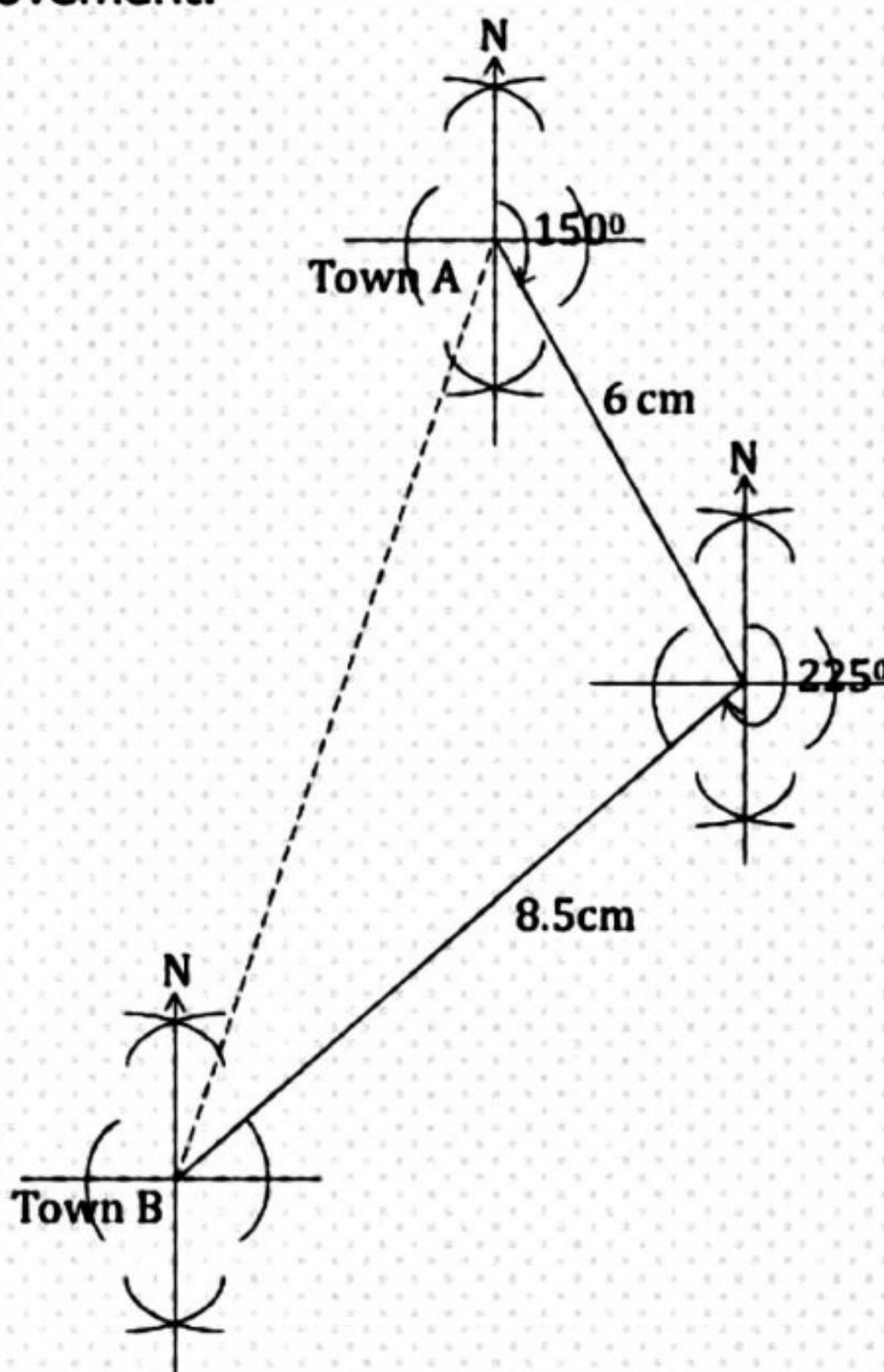
Drawing length

60
10

6 cm

85
10

8.5 cm



- (c) If he returned directly from town B back to town A, find the shortest distance between the two towns. (01 Mark)

$$B \text{ to } A = 11.7 \text{ cm}$$

$$\frac{117}{10} \times 10$$

$$117 \text{ km}$$

END